May 8, 1945. E. L. McKINNEY 2,375,669

REFLECTOR

Filed Sept. 17, 1943

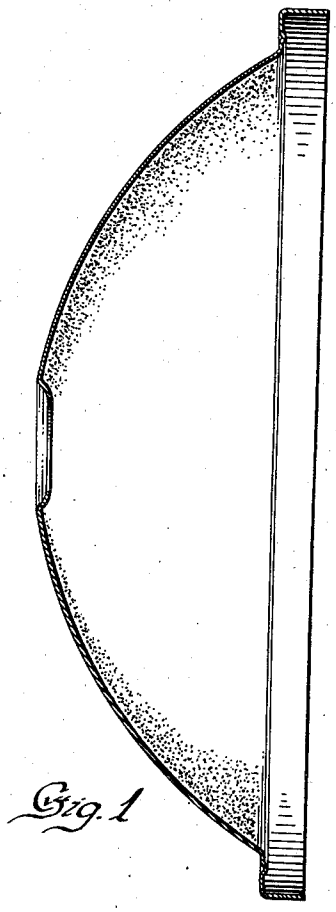


Fig. 1

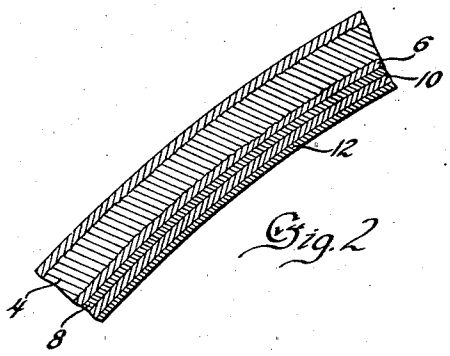



Fig. 2

Inventor.
Edgar L. McKinney
By
Blackmore, Spencer & Hurt
Attorneys

Patented May 8, 1945

2,375,669

# UNITED STATES PATENT OFFICE

2,375,669

## REFLECTOR

Edgar L. McKinney, Anderson, Ind., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application September 17, 1943, Serial No. 502,776

3 Claims. (Cl. 88—105)

This invention relates generally to reflectors for lamps and more particularly to the manufacture of reflectors of sheet steel or the like for use in automobile headlamps such as is also the subject of my application, Serial No. 421,886, filed December 6, 1941, of which the present application is a continuation-in-part.

Reflectors for automobile headlamps have been heretofore quite generally manufactured of brass which is relatively soft and may be readily drawn into the desired form with an accurate, optically smooth surface that can be directly coated or plated with a metal of high reflecting efficiency. It was found, however, that the surface of a reflector drawn from sheet steel is not optically smooth but has minute irregularities and blemishes or scratches which would remain after the plating operation and produce a defective light distribution and inefficient reflection.

It was proposed in my prior application to overcome this defect of sheet steel reflectors, or reflectors of other material which might not have an optically smooth surface, by coating the surface with a suitable filler which would flow into and fill any surface pits and crevices and form a smooth film on which the reflecting material could be applied. In actual practice, the filler consisted of two coats of black baking enamel with a baking operation after application of each coat to produce an optically smooth surface having high opacity and gloss, and aluminum was used as the reflecting material and applied by vaporizing the aluminum in a vacuum in accordance with known practice.

Sheet steel reflectors with enamel and aluminum coatings as described above have been found to be very satisfactory and have been adopted in certain automobile headlamps of the so-called sealed beam type and certain vehicle blackout lamps having sealed lighting units wherein both the lens and lamp bulb are sealed to the reflector so that the reflecting surface is not exposed but is fully protected from moisture and from handling.

In the use of these reflectors for unsealed lamps or lighting units which can be readily disassembled, the reflectors are not as well protected from moisture and the reflecting surfaces are subject to cleaning and handling. To protect the aluminum surface it was desired to coat the same with a hard, clear lacquer or enamel which was found, however, to ruin the reflecting surface since the thinners or solvents in the lacquer were apparently penetrating the aluminum coating and attacking or dissolving the black enamel and causing it to bleed through the aluminum.

It was to remedy this condition that the applicant conceived the idea of providing a substantially insoluble coating under the aluminum which would not be attacked or dissolved by the surface lacquer. One of the materials found to possess the desired properties was phenolic varnish which is insoluble in most solvents and may be readily applied over one coat of black enamel to produce an optically smooth surface with a high gloss on which the vaporized aluminum may be readily deposited. The protecting coating of clear lacquer or enamel may then be applied over the aluminum coating without damage to the reflecting surface which will retain its high reflecting efficiency.

In the drawing illustrating a reflector which is made in accordance with the present invention, Figure 1 is a central cross section of the reflector and Figure 2 is an enlarged detail view in section to show the several coatings which are applied to the base material.

Referring to Figure 2, the numeral 4 has been applied to the base material which is preferably a sheet steel stamping which has been drawn into the desired shape, such as concavo-convex or parabolic, and which is shown as having produced a surface which is not optically smooth but has minute irregularities and blemishes or scratches. This surface is first coated with a filler indicated at 6 such as paint or enamel of such low viscosity as to flow into and fill the irregularities in the surface and form an optically smooth surface. The filler 6 preferably consists of one coat of black enamel approximately .001 inch thick which may be applied by dipping and is then baked. This is followed by a coating of some material such as phenolic varnish, as indicated at 8, which is substantially insoluble by solvents or thinners of lacquer. The phenolic varnish is also approximately .001 inch thick and is baked before the next operation.

The reflector is then coated with a metal of high reflecting efficiency such as aluminum, as indicated at 10, which may be applied by sputtering or vaporizing in a vacuum. The aluminized reflector surface is then coated with a relatively thin film of clear lacquer or enamel as indicated at 12 which is approximately .0007 inch thick and is baked after application.

The foregoing process has been found to produce a reflector having high optical efficiency at a relatively great saving over the cost of reflectors made of brass which is not at present readily

available. Although the base material has been designated as preferably sheet steel and a preference has also been expressed as to the several materials used to coat the base material, it will be apparent that other materials may be found to be equally suitable and are contemplated as coming within the scope of my invention as defined by the following claims.

I claim:

1. A reflector having high optical efficiency comprising a base of a material having a substantially smooth but optically rough reflecting surface, a filler on said surface of a material soluble by lacquer solvents and of high opacity to form an optically smooth reflecting surface, a coating thereon of a material substantially insoluble by lacquer solvents, a relatively porous coating of a metal of high reflecting efficiency, and a protective coating of lacquer over said metal.

2. A reflector having high optical efficiency comprising a base of a material having a substantially smooth but optically rough reflecting surface, a filler on said surface to form an optically smooth reflecting surface consisting of a high gloss enamel which is soluble by lacquer solvents, a coating thereon of a material substantially insoluble by lacquer solvents, a relatively thin coating of aluminum of high reflecting efficiency which is penetrable by lacquer solvents, and a protective coating of lacquer over said aluminum.

3. A reflector comprising a base of sheet metal having a reflecting surface, a coating on said surface of a high gloss enamel which is soluble by lacquer solvents, a coating of phenolic varnish which is insoluble by lacquer solvents, a relatively thin coating of aluminum which is penetrable by lacquer solvents, and a protective coating of lacquer over said aluminum.

EDGAR L. McKINNEY.